https://engineering.purdue.edu/~chihw/22ECE639F/22F_ECE639.html

Question 32: [Lin, Costello Jr., Error Control Coding 2nd Ed., Similar to Problem 6.2]
This question will worth 30 points instead of regular 10 points. Suppose we are interested
in devising a (63,k) binary primitive BCH codes with $n = 2^m - 1 = 63$ and $m = 6$. If we
would like to correct $t = 2$ errors, find out all possible choices $g(x)$ that can still give you
the smallest-degree $g(x)$. Please assume $GF(2^6)$ is generated by $x^6 + x + 1$.

Question 33: This question will worth 50 points instead of regular 10 points. Continue
from the previous question. **But we assume β^1 to β^4 are used as the roots of $g(x)$.**
Please fix one particular choice of $g(x)$. Suppose the 10-th and the 47-th locations of the
bits are in error (the codeword has the 0-th position to the 62-nd position). Find the
syndromes S_1 to S_4 and also find the error location polynomial $\Lambda(x)$ by the Peterson-
Gorenstein-Zierler algorithm.